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# TRAINING AND WORK.

BY


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ADDRESS TO THE SHEFFIELD FEDERATED HEALTH  
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MR. CHAIRMAN, LADIES, and GENTLEMEN, The subject that I have selected for my lecture to-night is that of Training and Work. Work is sometimes a great burden when excessive, because it may cause suffering, disease, and death. Yet work on the whole is a blessing and compulsory idleness is a curse. We hear at present a great deal about the unemployed and of the misery that want of work is causing to unemployed men, to their wives and to their children. There can be no doubt that the existence of so many unemployed is a great evil, and in order to remove it we must try to find out the causes to which it is due. The unemployed may, I think, be divided into three classes, first, those that cannot get work; second, those that cannot work; and third, those that will not work. The reasons why some cannot get work depend on commercial and economic conditions which it would be apart from my subject to discuss to-night. I may, however, mention one point to which I will afterwards have to refer, namely, that work has a great tendency to go to the cheapest producers. While strikes and limitation of the hours of labour may raise wages for a time, yet we have to consider that we have now competitors in every part of the world, and that increased wages or diminished output of work in this country may throw contracts into the hands of our foreign rivals. To avoid this and to maintain our supremacy as a manufacturing nation, it is advisable for us now, and it may be absolutely necessary for us in the future to increase the working power of our men, and the means of getting better food and more comfort out of their wages, even

though those wages should be smaller than those they earn at present. It seems to me that one of the reasons why some French and German workmen are able to work more cheaply than ours is that the cost of their living is smaller, and that by their methods of housekeeping they actually get much more comfort out of their smaller wages than our men do at home. Especially does one notice that in France the wives of artisans will furnish a most appetising meal from cheap materials, some of which in this country would be thrown aside as waste. A knowledge of cookery on the part of the wives is one of the means by which our artisans may hope to get more nourishment out of their food, and more pleasure in their meals, so that they will feel less need for stimulant than they do at present. But it is the girls who are at school now that will be the wives of ten years hence, and to this subject I must again return in considering training.

The next class we have to consider are those that cannot work. We see numbers of people, some of whom may be crippled, in body, and others crippled in mind, who are unable for work of any kind, and these are provided for in our infirmaries and asylums. But there are many more who are free from any obvious disease either of mind or body, and yet who are so generally feeble, or as the Scotch term it, "feckless" that they can do little excepting unskilled work, and not a great deal of that. Many of these have been neglected as children, ill fed in youth, and grow up to be a burden upon their relatives, upon their friends, or upon the rates. One of the great objects we should aim at is the extinction of this feeble folk by raising in its place a race of healthy babies, sturdy children, and strong men and women. The means by which this may be done we shall come to later on.

The third class are those who won't work. Last year the Guardians of the Poor for Westminster gave way to a demonstration made by the unemployed and decided to open labour yards for them. The work was easy, chopping wood, for three days in the week. The pay was good, averaging eighteen or twenty shillings a week for a family of four persons, only the man being required to work. Five hundred men had taken

part in the demonstration, but out of these only one hundred and fifty appeared in the labour yards on the first day. Every day afterwards the number diminished, and on the fifth day there were only five men who thought it worth their while to do this easy work for the pay. At the end of a fortnight the labour yards were closed and have not been opened since. Here, then, we have a lot of men who would not do steady work for steady pay, and yet there seemed to be no reason why they should not do so. One is very apt to say that this is entirely a moral question, and has nothing to do with physical conditions. No doubt it may be so, but my business is not to preach morality, but to discuss training.

We talk of the mind and the soul, of intelligence and morality, but we can only judge of these possessions of a man



FIG. 1.—Bones of Arm, with Biceps Muscle passing over two Joints—that of the Shoulder and that of the Elbow. From Huxley's 'Physiology.' By kind permission of Messrs. Macmillan and Co.

by his acts, by what his face expresses, his tongue tells, or his body and limbs do. Now all the motions of the face, tongue, and body are due to contractions of the muscles, the little masses of flesh which you see in a butcher's shop, and which during life moved the limbs of the sheep and oxen. You can feel the same in your arm by placing your hand upon it and then raising your hand to your shoulder, when you will feel that well-known muscle, the biceps, become thickened and shortened in the process. By this thickening and shortening of the muscles the bones are moved and actions are performed. It is important that these actions should be done quickly, and this is



effected in many cases by having the muscles pass over more joints than one. Thus the biceps passes over both the shoulder and elbow joint, and by its contraction tends not only to bend the arm at the elbow, but to raise the elbow itself towards the shoulder. The same arrangement occurs in many other joints, as you will see from Fig. 2, which I have copied from Professor Huxley's Lectures on Physiology. Even in such a simple act as that of standing, a great many muscles have to act together and, to use Professor Huxley's words, "This position, easy as it seems, is the result of the contraction of a multitude of muscles which oppose and balance one another. Thus, the foot affording the surface of support, the muscles of the calf must contract, or the legs and body would fall forward. But this action tends to bend the leg, and to neutralize this and keep the leg straight, the great muscles in front of the thigh must come into play. But these, by the same action, tend to bend the body forward on the legs, and if the body is to be kept straight, they must be neutralized by the action of the muscles of the buttocks and of the back. The erect position, then, which we assume so easily and without thinking about it, is the result of the combined and accurately proportioned action of a vast number of muscles.

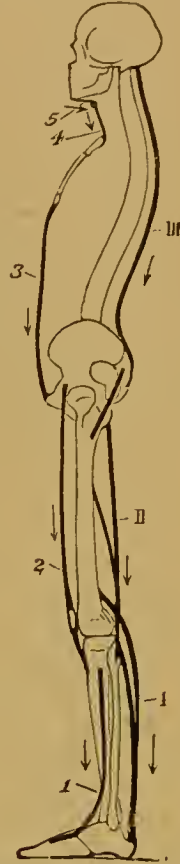


FIG. 2.—Diagram of Muscles which maintain the erect posture. After Huxley. The muscles are—I, of the calf; II, of the back of the thigh; III, of the spine (these tend to keep the body from falling forward); 1, of the front of the leg; 2, of the front of the thigh; 3, of the front of the abdomen; 4 and 5, of the neck (these tend to keep the body from falling backwards); the arrows indicate the direction of action of the muscles, the foot being fixed.

What is it that makes them work together in this way?" If a man receives a violent blow on the head while he is standing, he falls down, and may remain senseless and limp for a long time; all his muscles have ceased to act, and his mind is a blank, and he has no more power to do actions, either good or bad, than if he were dead. The reason of this is that the blow has destroyed for the time being the functional activity of his brain. We do not know how the mind and brain are connected, and very probably never shall, but we know perfectly well that the mind works through the brain, and that by altering the brain you may modify a man's understanding or his morals. By giving a man a lot of whisky you will muddle his brain so that he is incapable of understanding what is told him, although his life or death may depend upon his intelligence. By a large dose of opium or chloroform you may render him senseless, helpless, and as unfeeling and unresisting as a dead man, and by haschish you may render him temporarily insane. A blow on the head, as I just said, will make a man senseless for the time being, but if it is not so severe as to damage his brain he will awake from his insensibility with nothing worse than a bad headache, and be as intelligent and as moral as before.

But if the blow be very severe it may affect his mind in very curious ways. In one of my patients, a man who was thrown from a horse and got a deep indentation in his skull, seven years were cut out of his life. When he was thrown from his horse he was a stockbroker in active work with a wife and several children, but when he awoke from his unconsciousness he had practically lost seven years of his life. He believed himself to be a student at college. He never regained this seven years, he had to be told by others who he was and to be introduced to his wife and family, who were then to him total strangers.

But a man's moral nature may be influenced permanently by an injury. There was a man named Gage, near Boston, in America, who was engaged one day in ramming a charge of powder into a rock. The powder exploded, and the crowbar he was using, which was 3 feet 7 inches long and  $1\frac{1}{4}$  inches in diameter, was driven right through his head, entering beneath his

lower jaw and coming out at the top of his head. Wonderful to say, he recovered from the injury, and lived for  $12\frac{1}{2}$  years afterwards, but from that time onward he was a changed man. He had previously been a foreman, very steady and trustworthy, energetic and persevering, but after the accident he became lazy and erratic, drunken and profane, obstinate, yet vacillating, so that those who knew him before said that he was "no longer Gage."

We see, then, from these instances, how the brain can affect the mind; we must now see how it affects the body. It is just about thirty years ago that my friend Dr. Ferrier, in a series of admirable experiments done at the West Riding Asylum, showed that irritation of certain parts of a monkey's brain produced definite movements in the eyes, head, and limbs. I assisted him in a number of these experiments, and found that I could not possibly remember the order in which the movements came until it occurred to me that the centres were arranged in the order necessary for obtaining food, and the easiest way to remember them is to take the story of Adam and Eve. I must premise that each side of the brain directs the actions on the opposite side of the body. When centre No. 1 (Fig. 4) is stimulated the eyes and head turn to the opposite side just as when Eve looks at the apple, No. 2 causes extension of the arm and hand, and contraction of the fingers in the act of taking by the action of it, by the exercise of centre No. 3 she brought it to her mouth, by that of No. 4 she ate it (movements of the lips and mouth), by No. 5 she threw away the seeds, while Nos. 6, 7, 8 regulate the movements of the foot, legs, and trunk in going to get another for Adam. Although the position of these centres was discovered by experiments upon monkeys, yet cases of disease of the brain have shown that their position is nearly similar in man.

It has been found that when a man has lost an arm or a leg, the centre in the brain corresponding to it wastes, so that it is evident that while the brain acts upon the body in producing movements, the body also reacts upon the brain, and there can be no doubt that, just as the absence of a limb causes wasting of the corresponding part of the brain, so movements and





FIG. 3.—Adam and Eve.



training of a limb develop the corresponding nerve centres in the brain.

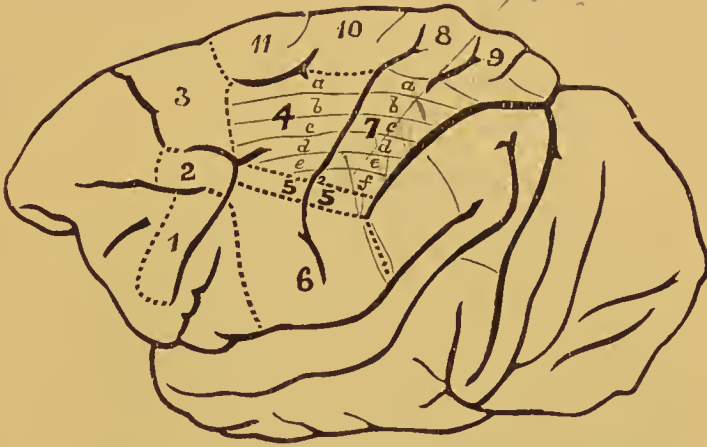


FIG. 4.—Diagram of the Motor Centres in the Brain, modified from those of Ferrier and Horsley. The motor centres have been numbered so as to represent the successive actions in seeing, taking, and eating the apple, &c. 1, Eve sees the fruit (eyes turn to opposite side); 2, looks more eagerly at it (head and eyes turn); 3, turns towards it (head to opposite side); 4, puts forth her hand to take it (*a*, movements of shoulder; *b*, of elbow; *c*, of wrist; *d*, of fingers); 5, luxuriously shuts her eyes, so as to enjoy the sweet morsel more thoroughly; 6, eats the apple; 7, picks out and throws away the refuse (*d*, movements of fingers; *e*, of index; *f*, of thumb; *a*, *b*, *c*, as in 5); 8, 9, 10, 11, goes and gets another for Adam (8, movements of hallux; 9, of small toes; 10, of knee and ankle; 11, of hip).

One of the most important parts of training is exactitude. I have heard of a man who was asked how he made his fortune, and he said, "he made half by attending to his own business and the other half by leaving other people's alone." There is a great tendency amongst many people to do just the reverse of this, to attend more to other people's business than is either necessary or advisable. The same thing occurs in the brain, and when any movement is attempted for the first time, the nerve centres are liable to act in a confused manner, and not only to set too many muscles in action but to make them work violently and be in each other's way. If you watch a child learning to write you will see this well. A person who has learned to write usually uses his fingers gently and, to a slight extent, his hand. He holds the pen with the least possible pressure and allows it to

travel easily over the paper. But a child grasps the pen so firmly that you will see the fingers yielding under the pressure, so that their joints bend inwards, and the hand and even the arm are often quite rigid from the contraction of opposing muscles. Not only is this the case, but children very often stick their tongues out of their mouths, a motion which, as

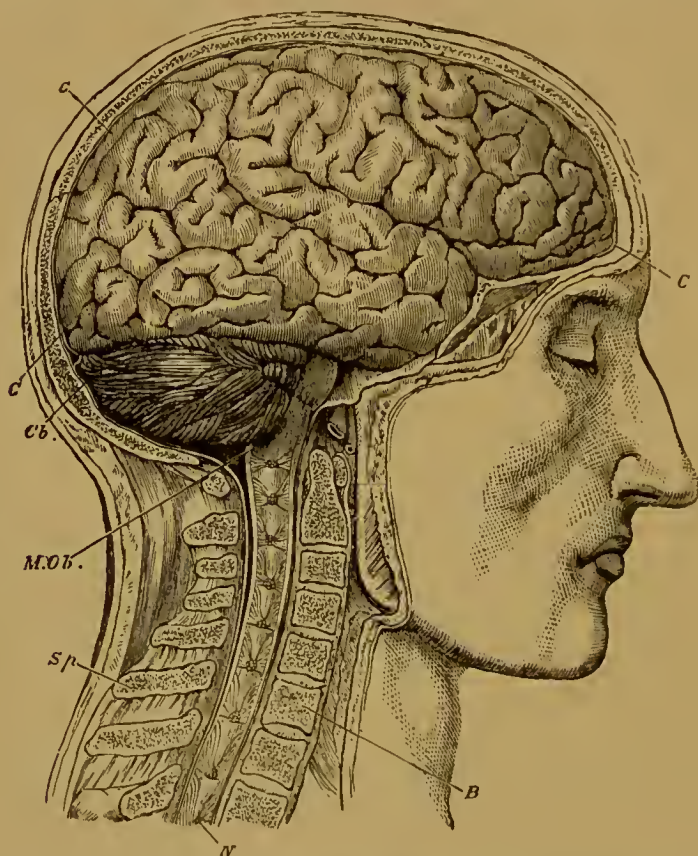


FIG. 5.—A Side View of the Brain and Upper Part of the Spinal Cord in place, the parts which cover the cerebro-spinal centres being removed. *C C*, the convoluted surface of the right cerebral hemisphere; *C b*, the cerebellum; *M. Ob.*, the medulla oblongata; *B*, the bodies of the cervical vertebræ; *Sp*, their spines; *N*, the spinal cord with the spinal nerves. After Huxley (by kind permission of Messrs. Maemillan and Co.).

Dr. Ferrier has shown, is due to the stimulus of the nerve centres for the fingers travelling over to the neighbouring one for the mouth. By slow degrees the nerve centres become trained, each to do its own work and, what is very important, they learn not only to cause the proper muscles to contract but



to make the opposing muscles relax, so that they do not interfere with one another's action.

The difference of the untrained and the trained brain is like the difference between a mob and a fire brigade. When the alarm of fire is raised and a mob rushes round the blazing pile, most of them do not know what to do and they get into one another's way, but in the fire brigade every man knows exactly where he ought to be and what he ought to do, and he does the best thing possible to gain his end. A similar difference exists between the actions of the muscles when set in action by

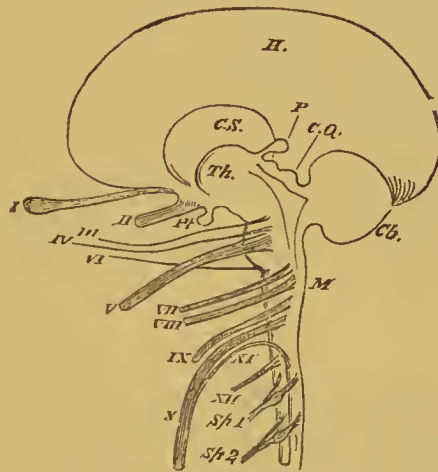


FIG. 6.—Diagram of Brain, Basal Ganglia, Medulla Oblongata, and Nerves. *H*, the brain; *C.S.* and *Th.*, basal ganglia (corpus striatum and optic thalamus); *Cb.*, cerebellum; *M*, medulla oblongata.

untrained and trained nerve centres. At first all movements are difficult, walking as well as writing, and so long as they are directed by the voluntary nerve centres in the brain itself, they are slow. But after a while the higher centres in the brain or cerebrum pass on the work to what are called the basal ganglia, which are lower down, and are connected with the muscles by means of the spinal cord and nerves. These gradually learn to do the required actions without our being really conscious of them, so that while we are walking and writing, our attention may be completely occupied with other things—with the scenery through which we are passing or with thoughts of the friend to whom we are writing. When movements have



been learned to this extent they are not only easier but quicker than before, and perhaps no better example could be given of co-ordination by the eye, the arm, the body, and the legs all working well together than in games of cricket, lawn tennis, or polo, where the course of the ball must be followed, its speed estimated, and the movements of the body adjusted so as to meet it with the bat or catch it with the hand.

The same process that occurs in writing, walking, or cricket takes place in the nerve centres in anyone learning a trade, so that a man who may afterwards become a most skilful workman is at first a clumsy apprentice and may spoil more than he makes. The nerve centres are more easily trained in youth than in adult age, and therefore careful training in youth is one of the necessities for the good work in adult life which will secure a man from falling into the ranks of the unemployed. But there are many trades in which, however good a man's brain may be and however dextrous his fingers, he is of little use unless he has got a good deal of muscular strength. Now, it is a property of the muscles that they grow stronger by use, and if we were to take a couple of youths of the same age from a clerk's desk and the same number from a blacksmith's shop, we should probably be able easily to tell their occupations by simply feeling the thickness of their arms. Yet it might be that if we felt the legs of these youths, those of the clerks might be larger and stronger than those of the blacksmiths, because in their spare hours they went in for running or other games which strengthen the legs. It is one of the disadvantages of many occupations that certain sets of muscles are brought into action and others are left undeveloped, and one of the objects of systematic exercise is to develop all muscles equally. The extent to which it is advisable to do this is shown by the success with which the Swedish, Sandow's, and other similar systems have been attended, and there can, I think, be little doubt that such exercises as they recommend would do much good by strengthening the youths of this country if they were more generally employed than at present. But when muscles become over developed, although useful to men who are lifting weights, they rather interfere with the rapid action which is



FIG. 7.—Hercules.



FIG. 8.—Apollo.







FIG. 9.—Athlete.



FIG. 10.—Diana.







FIG. 11.—Gladiator.



FIG. 12.—Runner.

really more serviceable to a man in general life, and what we wish to obtain by training is not so much the heavy body of a Hercules as the strong yet agile frame of a Mercury, boxer, disc thrower, runner, an Apollo, or a gladiator. Hercules might do very well as a coal-heaver, but where would he be in the cricket field? Great strength is often much less useful than power of endurance, which depends on strength and development of the heart and respiratory power.

For this reason I think that systematic physical exercise, such as that of the modern Swedish system, should form a part of the regular curriculum in schools, but in addition to this I think it is necessary to make ample provision for games, and, if possible, games in the open air. On this account playgrounds should be looked upon as quite as essential as schoolrooms. I have said that exercise tends to increase the size and strength of muscles, but this is only true if the muscle is well nourished. If the individual be badly fed, exercise, instead of producing increased strength causes the muscles to become thinner and feebler. It is therefore most important that growing children should be well fed. The question of how this feeding is to be accomplished is a most difficult one, for, on the one hand, it is evident that the increased physical exercise which is so highly desirable for training both the muscles and nerve centres, and thus producing a more perfect man, demands more food than would otherwise be required, and which ought to be supplied in sufficient quantity and of proper quality. But who is to pay for it? It has been said to me that it would be cheaper for the ratepayers to supply food gratis to children who require it, and thus enable them to grow up with sufficient strength and energy to become good workmen, and to prevent them falling upon the rates afterwards, rather than to pay for them perhaps during a great part of their lives, and certainly maintain them for a number of years in their old age. It may be said, also, that as the State has determined that children must be educated, and has provided the machinery for educating them, if necessary, at the public expense, the State should likewise provide the food which the child requires in order to enable it to learn and thus to profit by the elaborate educational machinery which the State

has provided. There may be some truth in both these arguments, but, on the other hand, it is certainly inadvisable to lessen the responsibility of parents towards their children, and at the same time it is not fair to throw the burden of feeding the children of the drunken, thriftless, and lazy upon the steady, saving, and hardworking, who have often enough to do to bring up families of their own. Perhaps the best course to be followed might be to have luncheon bars, or *cantines scolaires*, as Dr. Macnamara calls them, either in or near each school. At these bars meals might be supplied to the children of a cheap, nourishing, and appetising kind, and as they would be provided on a large scale, the cost of production would probably be less than if they were cooked at home. They ought not to be sold to the children for money, because children would be tempted to go without nourishing food and to spend their pence in a pastrycook's or sweet-shop. They should be given in return for tickets, which those parents who could afford it should buy, and which might be given by charitable people or societies, or even by the guardians of the poor, to children whose parents were quite unable to pay for them. The preparation of so much food would give much greater opportunities than at present for teaching the girls practical cookery, and they would not only prepare the food, but taste it themselves afterwards. In some places where this is done I believe the girls are also taken to the markets, so that they may learn what food costs and how to buy it. The teachers also show how they can get the most nutritious food for the least money, and how to present it in the most appetising form. It seems to me that with such training for the schoolgirls, who will in ten years more be the wives of our artisans and the mothers of their families, is one of the most valuable means of securing the maintenance of our industrial supremacy by enabling our workmen to get the greatest nourishment and most comfort out of the smallest wage, and thus, if needs be, to meet our Continental rivals on their own ground, and turn out work as good, or better, than theirs at even a lower price. One may hope, too, that the training which the girls receive in this way may perhaps react upon the mothers at home and lead to better cooking than before.

But it is not simply the food which we put into the body that nourishes; it is that portion of it which is assimilated and digested. Now the first part of digestion is mastication, and many children cannot masticate thoroughly on account of the defective condition of their teeth. Others cannot take their full share in games without harm, because their hearts or lungs are feeble or diseased, and others, again, suffer from headaches or are punished for stupidity because they cannot see clearly the books that are given them to read or the figures drawn upon the blackboard. In order to prevent the mischief and suffering which results from these defects not being recognised, *some system of medical inspection in schools is absolutely necessary.*

I have spoken already of the exercises which enable the various parts of the body to work harmoniously together, but something more than this is wanted to perfect the man. He must be able to work along with others. The drill which a team for football, cricket, or boating gets from its captain or coach is very thorough, so that each one must work in perfect harmony with the others, or else he will spoil the match.

But such drill is for the favoured few who are selected to form part of the team, and we really need to have some kind of drill for all children—not so perfect, perhaps, as the kind of training about which I have just spoken, but still enough to teach them how to work together in harmony, and to obey readily the word of command. Such training is useful in every occupation, and the habit of obedience in boyhood increases the efficiency of a man in later life in almost any walk of life. There is a critical time, too, in a boy's life when he is just emerging from the discipline of home or school, and has not yet entered upon the duties and responsibilities of a man. It is very important, I think, at this time that his attention should be engaged with such occupations and amusement as will keep him from evil ways and tend to his development in the right direction, and amongst these occupations I regard Volunteering as one of the best. I most sincerely trust, therefore, that the Government which has just come in will, to the utmost of its ability, aid Volunteering in all its branches, and will recognise not only full-grown Volunteers, but boys' brigades of all sorts.





FIG. 13.—A Constitutional Walk. "An Agreeable Duty" (after Leech).—*Punch*, March, 1848, vol. xiv, p. 124. (By the kind permission of the proprietors of *Punch*.)

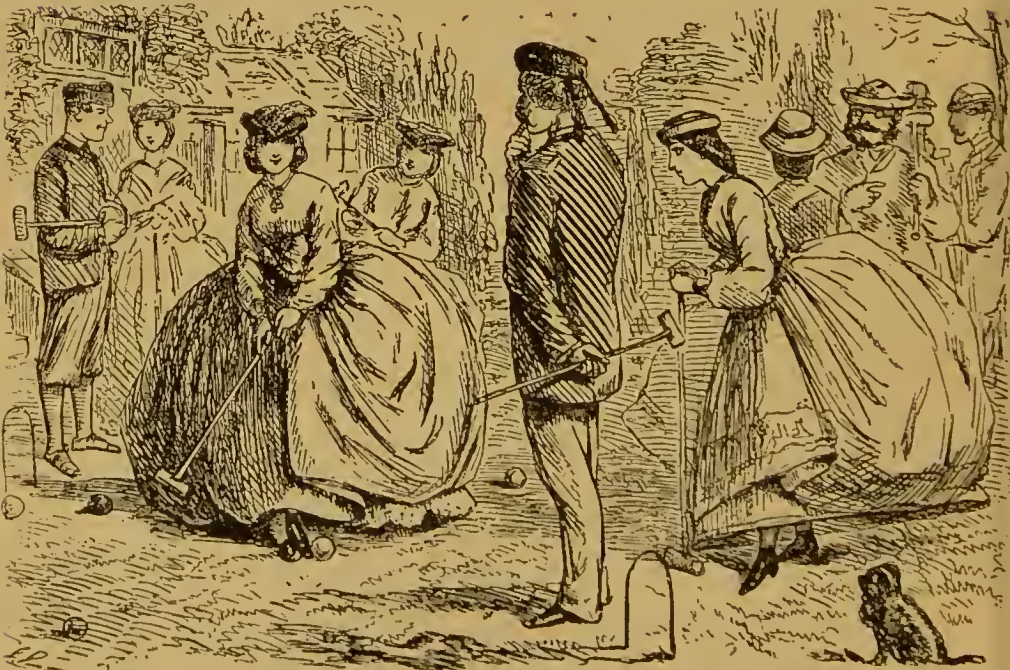


FIG. 14.—Croquet. "A Nice Game for Two or More" (after Leech) —*Punch*, August 17, 1861. (By the kind permission of the proprietors of *Punch*.)





FIG. 15.—Lawn Tennis. “A Modern Tournament” (after Du Maurier).—*Punch*, September 3, 1881. (By the kind permission of the proprietors of *Punch*.)



FIG. 16.—Polo. “The Lists at Hurlingham” (after Du Maurier).—*Punch*, July 24, 1886. (By the kind permission of the proprietors of *Punch*.)

For girls we want clubs where they shall be able to meet together and enjoy social conversation, instead of being thrown together with boys and youths in the streets, and thus, to a certain extent, early marriages, which are so productive of unhappiness at home and of feeble offspring, may be prevented.

I have been talking hitherto of boys and girls, but, as some one very pertinently said to me, there will be no boys and girls to teach and to train if the babies all die off in infancy. This is very true, and the appalling mortality of infants is one of the subjects that requires the immediate attention of the nation. Efforts are being made everywhere throughout the country to lessen this mortality, and the Health Department of Sheffield has issued advice on the feeding and rearing of infants for the use of mothers which is likely to be very useful. To quote from this, "An enormous number of children die every year in Sheffield from diarrhoea, more especially in the months of August and September, and it is quite certain if they were fed and reared according to the directions given, and were not given sour milk and other quite unsuitable food, and at the same time their clothes and their homes were kept clean, the majority of these infants would not die."

In August and September it is sometimes very difficult for mothers, however careful they may be, to obtain good milk and prevent it from turning sour before it is administered to their children. Efforts must therefore be made to ensure a sufficient supply of good milk to towns, and if possible milk which is not prevented from turning sour by the addition of preservatives, but milk which is kept absolutely free from contamination from the time it leaves the cow to the time it is given to the child. Efforts to obtain this are being made in Liverpool, Glasgow, and elsewhere, and ought to be made in every town throughout the country. But one town does not always know what another town is doing for the prevention of infant mortality and the successful rearing of children and youths. It is therefore very important that all the successful methods adopted in one part of the country should be known in every other, so that like success shall be everywhere obtained. This does not apply merely to the question of infant feeding or to the question of milk, but to



the care of mothers during pregnancy and childbirth, to the care of children, to feeding in schools, to classes of cookery, physical training for boys and girls, and in fact for every agency that may tend towards the object which I mentioned at starting, namely, the rearing of a race of healthy babies, sturdy children, and strong and healthy men and women in place of the feeble folk who constitute the unemployed at present. Amongst the richer classes in this country there seems not to be a deterioration, but an actual increase in the strength and vigour of the race. The girls are much taller and more athletic, men live longer and work to a greater age, and part of this increase is probably due to the greater amount of physical training—that exercise that has become general, especially amongst women, of late years. There is probably no more trustworthy mirror of our nation's life than the pictures from *Punch*, and those which the proprietors have kindly permitted me to use depict the growth in strength and agility corresponding to more active games amongst women. It is the object of the National League for Physical Education and Improvement that the same development of strength and physique that has occurred amongst the richer classes of this country should occur also among the poorest, and for this reason I ask that you will take the League to heart and establish a branch of it here.







